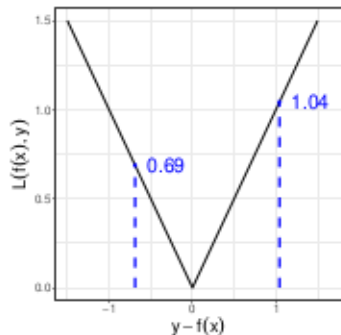
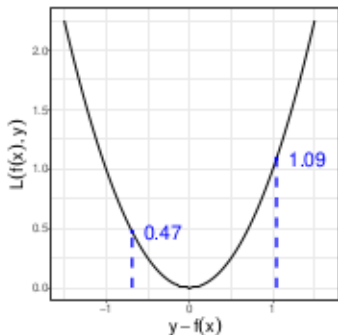


# LINEAR MODELS: L1 VS L2 LOSS

Loss can be characterized as a function of residuals  $r = y - f(\mathbf{x})$



- **L1** penalizes the **absolute** value of residuals
- $L(r) = |r|$
- Robust to outliers



- **L2** penalizes the **quadratic** value of residuals
- $L(r) = r^2$
- Easier to optimize

# LINEAR MODELS: L1 VS L2 LOSS

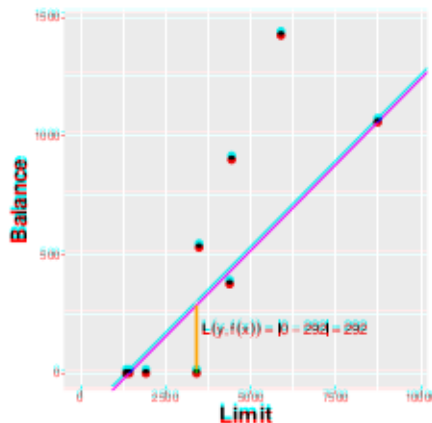
- **L1** Loss is not differentiable in  $r = 0$
- Optimal parameters are computed numerically

- **L2** is a smooth function hence it is differentiable everywhere
- Optimal parameters can be computed analytically or numerically

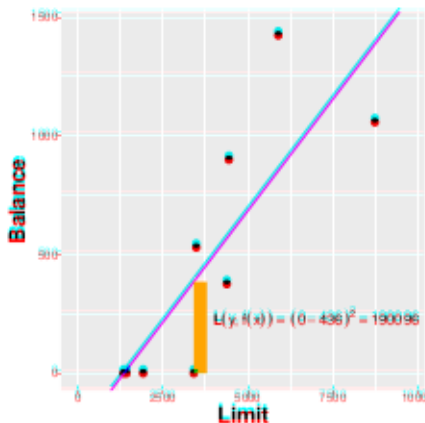


# LINEAR MODELS: L1 VS L2 LOSS

- The parameter values of the best model depend on the loss type



- $\hat{\theta}_{L_1} = 0.14 \rightarrow$  if the Credit Limit increases by 1\$ the Credit Balance increases by 14 Cents



- $\hat{\theta}_{L_2} = 0.19 \rightarrow$  if the Credit Limit increases by 1\$ the Credit Balance increases by 19 Cents